

I See! System

Informs. **S**ets Expectations. **E**ducates. **E**ases Anxiety.

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Executive Summary

Problem

Patients and families have limited access to the healthcare information they need. Children are often scared and anxious about undergoing medical procedures causing confusion, frustration, and anxiety. Child Life Specialist and kid-friendly materials are not always available; therefore, hospitals lack the special and critical resources needed to create a patient-centered environment. Challenges in creating effective information tools include:

- Limited availability of Child Life Specialists and Interpreters who are trained in communicating with children and multi-lingual patients.
- Low healthcare literacy and increased stress that affect people's ability to read, understand, and act on health-related information.
- Wide range of age groups and education levels.
- Lack of creative and interactive tools that engage and empower pediatric patients.

Solution

The I See! System is a healthcare communication tool that informs, sets expectations, educates, and eases anxiety. This system was created in collaboration with Child Life Specialists to provide information that patients and families need in a fun and effective way. It is a mobile, touch-screen computer created to overcome communication barriers because it is:

- Age-Adaptable
- Audio-Visual
- Multi-Lingual
- Multi-Sensory
- Interactive
- Procedural

Evidence shows that proper pediatric preparations can significantly reduce stress and anxiety for the child, as well as increase the incidence of post-hospital benefits. This system incorporates introduction videos by Child Life Specialists, interactive games, key words, and a parent's section. Incorporating interactive, multi-sensory, and audio-visual techniques allows the system to be fun for the child while empowering them to learn and understand the process.

The Future

The I See! System will be a completely mobile, computerized device that can be easily controlled by the patient. This device is similar to a Game boy and can be carried into any patient or procedure room. Age and language-specific modules can be created for any hospital department such as the ED, inpatient areas, surgery, or clinics. This system is also internet accessible allowing patients and families to access the information from home. This will create a continuity of care for their pre or post hospital visit.

The Problem

When children and their families go to the hospital, they do not always understand the medical processes and procedures they are about to experience. They are often scared and anxious because they have unanswered questions and do not know what to expect. There is a lack of information and educational tools they need to answer their questions and calm their fears. Creating, providing, and accessing this information is difficult for many reasons including; limited availability of trained professionals, low healthcare literacy, a wide range of patient ages and languages, and a lack of fun, interactive tools.

Child life specialists are employed in the hospital to explain to children what is going to happen during their exams. These specialists break down complicated medical procedures into a language that children can understand¹. They are able to calm the child's fears and empower them with an understanding of what will happen. These specialists are great resources, but they are not always available due to the small number employed in the hospital and their working hours. Even when they are available, they only have limited teaching resources such as paper pamphlets or books. It is difficult to make these tools fun, engaging and interactive, and many times, they are not available for multiple educational levels or languages. Hospital interpreters are critical for communicating with foreign-speaking patients and families, but they are not always available for every patient.

Healthcare literacy is a major challenge when creating informational tools. Literacy and stress affect people's ability to read, understand and act on health related information. The following statistics demonstrate how a teaching sheet that is primarily text would be ineffective².

- Average U.S. adult reads at an 8th grade reading level.
- Twenty percent of Americans read below a 5th grade reading level, and five percent cannot read at all.
- The average Medicaid, Spanish-speaking reading level is 3rd grade.

People who cannot read the only informational material available are at a huge disadvantage. Research shows that these people more likely to make errors when taking medicines, less likely to follow a treatment plan, and are at higher risk for hospitalization and readmission.

Pediatric hospitals must communicate with a very diverse patient and family population. Their patient population can range from a 1-day-old infant to an 18-year-old adolescent. This wide range in patient ages, translates to a wide range of patient understanding and education levels. This means that one information tool will not adequately serve their population, requiring many tools to effectively serve each group. For example, a CT exam will be explained very differently to a 6-year-old verse a 15-year-old. They also have the added complexity of communicating to the family members. It is usually just as important that both the child and the parents understand what is going to happen. The understanding and anxiety of all people involved can influence the experience of the patient.

Many pediatric hospitals lack fun and interactive tools to educate their patients and families. The most common resources are teaching sheets, which are primarily text, and videos³. While these meet some of the criteria for effective pediatric preparation, they do not combine all of the necessary attributes for effective communications. Many people may not be able to read and understand the teaching sheets, and they will not engage a child. Videos can help with literacy issues, but they are not age-adaptable or interactive.

There are many barriers to effectively communicating with patients and families and providing them with the medical information they need. This causes confusion, frustration, and anxiety. The pediatric healthcare system needs fun, interactive, and age-specific tools to help prepare children for the best outcomes.

Solution

Our group developed the I See! System to fix this problem. This system is a mobile, touch-screen computer with web-based applications. The goal of the I See! System is to:

- Inform
- Set Expectations
- Educate
- Ease anxiety

This system was created in collaboration with Child Life Specialist to overcome communication barriers and incorporate the best techniques in pediatric preparation. The I See! System provides information in a fun and effective way that all people can understand. Anyone from a 5 year-old who speaks Spanish to a parent who speaks English will be able to use the I See! System. They will be able to use this system to answer their questions, calm their nerves, and improve their understanding. This system was developed with 6 key attributes:

- | | | |
|-----------------|----------------|-----------------|
| • Age-Adaptable | • Audio-Visual | • Multi-Lingual |
| • Multi-Sensory | • Interactive | • Procedural |

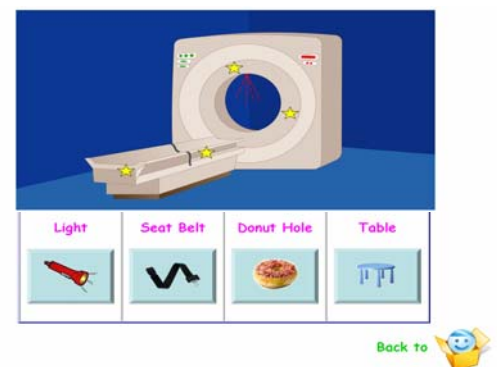
The I See! System was not developed to replace the Child Life Specialist. It is designed to aid the specialist when teaching children procedures, but if a child life specialist is not available, it can be used by itself to inform children and parents about their procedures. This system has several tools that explain a complicated medical procedure in a way that the patient can understand. Introduction videos explain procedures in kid-friendly language that helps them related it to an experience this more familiar. Interactive games put the patient in control and expose them to both the procedural and sensory aspects of the process. There are also tools that help explain the who, what, when, where, why, and how of the process. The goal of the system is to empower the patients and their families and to create a patient-centered environment.

After visiting Children’s Healthcare of Atlanta at Hughes Spalding, we determined there was a high need for an I See! Module in their radiology department. Many patients have little to no understanding of these complicated diagnostic imaging exams, and a high portion of their population is Spanish speaking. Their radiology department had a difficult time explaining the procedures and communicated to foreign speaking patients and families. Our prototype for the radiology department contains an I See! Module for CT scans. This module focuses on patients ages 3 to 6 years old. The CT module includes videos, interactive games, a keywords section, and a parents’ place section. All tools are available in English and Spanish.



Videos: Upon entering the CT module, a video of a child life specialist explaining a CT scan. They use in kid-friendly language and showing pictures of an actual CT scan is shown. The user can then choose to play games, learn keywords, or read about the basics of a CT scan.

Interactive Games: The games section includes three different games. The first game is “Who’s Who?” The child can touch a person and listen to who they are and why they are in the radiology department. There is Susi, the nurse who performs the scan. There is also David, a little boy who is there for a CT scan also, and his father. The next game is titled “What is a CT machine?” This game allows children to point out different parts of a CT scanner. It relates these different parts of the scanner to everyday objects that children are familiar with such as lights, seat belts, donuts, and tables. The last game, “Let’s Perform a CT exam!”, allows children to perform their own CT scan. Children can move the table, hear the noise the CT scanner makes, see the light the CT scanner makes, and take their own CT scan.



Key Words: Another section of the module is the keywords section where the user can learn some of the keywords that they might hear while having a CT scan. The four keywords defined are intravenous injection, contrast material, sedation, and immobilization. This section incorporates pictures and text to explain each term. All written material is at or below an 8th grade reading level.

Touch to Learn More!



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Parent's Place: The last section of the module is the parents' section. This section includes explanations of the six questions: who, what, when, where, why, and how. The explanations are written below an eighth grade reading level because that is the average American healthcare literacy rate.

The CT module has both English and Spanish versions. This allows for the Spanish-speaking patients to learn as well without having to use an interpreter.

Future

We envision the I See! System as a mobile device similar to a handheld game system, such as a Gameboy or a Leapfrog Leapster. This would make it familiar to children because they are used to playing these types of games. A mobile system would allow it to be used anywhere in the hospital. Our group envisions the system being used in multiple applications. It could have modules for many different departments in the hospital, such as:

- Emergency Department
- Surgery
- Inpatient areas
- Sickle Cell and Asthma Clinics

Children and their families will be able to access the system on the internet as well. This allows for preparation for the procedure before arriving at the hospital. This will in turn save time at the hospital and let children and their families become more familiar with what is going to happen.

Process to Solution

Meeting at Hughes Spalding

Our group first went met with supervisors from different areas at Hughes Spalding. We discussed different ideas and opportunities for an information messaging system in the hospital with Starla Jones, Angela Smith, and Melia Stephens, the supervisors from radiology, the emergency department, and the inpatient area, respectively. We developed a couple of ideas during the meeting. The three main ideas were using a system in radiology to explain procedures, a system in the inpatient area to give information to visitors, and a system in the ED to explain the process. We then came up with the I See! System after presenting our ideas to the Pediatric Design of the Future class.

Meeting with a Child Life Specialist

We met with Katie Bubser, a Child Life Specialist at Children's Healthcare of Atlanta, to learn the process she uses to prepare children for diagnostic imaging. Katie provided insight into the techniques and consideration we would need to make in creating an effective system. We learned that the age range of the child plays a critical role in the information that is provided, when it is provided, and how it is taught. At the Egleston Children's Hospital's Radiology Department, CT scans are a high priority test. Many children ages 3 to 6 coming for a CT scan are scared and anxious about the exam, so preparation by a Child Life Specialist is recommended. We choose to develop the our I See! Module for CT scans with a focus on children ages 3 to 6 due to this high demand. Katie provided booklets, teaching sheets, and photographs that we used to develop the content in the I See! System. She also referred us to numerous Child Life Specialist and pediatric preparations books and articles for research and evidence for our system.

Evidence, Research, and Content Development

We conducted research on the latest pediatric preparation techniques and reviewed the existing Children's Healthcare of Atlanta materials to develop the content for the I See! System. The book "Child Life in Hospitals – Theory and Practice" by Thompson and Gene outlines the best practices in pediatric preparation as well as case studies showing the evidence of these practices. Case studies have proven that, "preparation in pediatrics is a proven technique that significantly reduces stress and anxiety for the child."⁴ Research shows that pediatric preparation techniques are most effective when they are interactive, procedural, and multi-sensory. We incorporated each of these elements into the I See! System to produce the best outcomes and overcome communication barriers. Controlled studies of patients who received multi-sensory preparation before surgery showed significant decreased in stress levels and increased incidence of post-hospital benefits. Incorporating preparation techniques that are fun and interactive while demonstrating procedural and sensory elements of a test or procedure will help empower the child to understand what will happen. "Preparation can eliminate the discrepancy between what the child imagines and what is real."⁵ By helping to set expectations, the children understand what will happen, therefore reducing their fears and anxiety.

The age of the patient is also a critical component. Evidence shows that the best way to prepare a toddler or school-age child is the same day as the test, right before it starts, where a school-age child can be prepared up to one or two days in advance⁶. The difference in the timing of the preparation inspired us to make the system mobile and internet accessible. This allows the material to view right before the test in the hospital or from the patient's home. Effective pediatric preparation can have many positive benefits in all areas of the hospital. Educating and informing patients and families in an effective way creates a patient-centered environment, reduces stress, and can improve outcomes.

Pediatric Preparation for Diagnostic Imaging has also seen proven results. At the Lucile Packard Children's Hospital Radiology Department, they saw a 20% decrease in sedation for CT scans once they started preparing children before the exam⁷. Child Life Specialist uses a wooden, 3-D model of a CT scanner to teach children about the exam and allow them to perform their own exam. The preparation helped to, "replace fear with understanding", by giving control to the child. Increased understanding and decreased fear reduced the need for sedation. This results in a safer, faster and less costly exam for the child.

Press Ganey, a healthcare customer service consulting firm, emphasizes the impact that access to information can have on a family's hospital experience and their outcomes. Press Ganey has shown that metrics associated with being informed have a high correlation with their overall satisfaction⁸. Being informed is a critical component to creating a patient and family-centered experience. Thomson and Gene also emphasized the importance of educating the parents and keeping them involved in the preparation process. When parents are informed and at ease, it translates to the child and helps to ease their fears.

I See! System Development

After outlining the framework, we choose HTML web design as the base and embedded some FLASH animation and video in it. Dreamweaver and Flash are the software we used to build our I See! System. The process of creating system was split into two parts. The first part was how to combine the game and information and arrange them properly inside this I See! system. Our team brainstormed several times to map out the content and flow of the system. We will use text information for parents and created some games let children be familiar with CT scan before taking exam. The second part is related to the technical development. Since we can only use the basic skills originally, we learn many web design skills from this project. For example, we learned how to produce a Flash button with sound and to convert video into the format that can be attached to the web. Also, the most important thing we learned from web design is

making organized plan before programming. Though a web designer could not know the whole picture of real website in advance, they have to think of preliminary script for the web. To follow the script will be the most convenient way to build a website and will not get lost on what kind of website you want.

Reflections and Discussion

Many visitors at our open house the last week of class mentioned to our group that we should try to test our system with children. We ultimately would like to do this because we anticipate that we would have extremely good results. Another comment that one visitor had was that we should have shown a nurse putting an IV in a patient in one of our games because that is one of the scariest parts of a CT scan. Our group never even thought about this aspect, and we believe that is a good idea and one that should have been included in our system. We have always thought that our system would be best utilized as a mobile system, but a visitor who runs data cables for CT scanners and MRI machines in hospitals thought that our system would work well in a CT scanner. He believed that a company like GE could place our system in a CT scanner and have good results.

The interdisciplinary approach of this class was a good experience. It was good to see how students from other disciplines and backgrounds think and see how they can use their expertise to contribute to the project. Our group was especially grateful for the interdisciplinary approach because Rung-Yu was the only person in our group who knew how to create a website. Without her, the two Health Systems students would have had to learn how to create a website and then create it in a short amount of time. All three of us had our contributing ideas that were carved by our backgrounds.

This semester allowed the three of us to learn what type of thought goes into designing a system for a healthcare application. We had never had experience creating anything specifically made for a healthcare environment, so we now have some expertise in this field. One of the key points that we learned about the healthcare field is that one has to consider the

users that are going to use the system being made. We focused mainly on children, which affected how we presented the information in our system. We did focus on parents as well, so we had to make sure they would be able to understand the information. We had to consider the literacy skills of our users. We also learned that it is necessary to work in collaboration with the caregivers and staff in a hospital. They are the ones that really know what is needed and what will help.

Our group had some ideas on how the class could possibly change to make it a less stressful and time-dependent course. We felt that we did not have enough time to develop the best system that we could develop. We believe that if we did not spend as much time with our original groups developing problems and solutions, we could have had a little more time to create our system. We did, however, think that being in the original groups researching and developing different ideas was beneficial. It allowed us to not get stuck in one train of thought. We also enjoyed being able to vote on what projects the class developed and picking what project we wanted to work on. This allowed the class to develop the best and most interesting ideas.

Acknowledgements

Our system would not have been developed without the financial help of Perkins+Will. It also would not have come to life without the advice and guidance from our professors. Julia Jones also provided guidance to our team. We would have never come to the idea for our project without Starla Jones, the radiology supervisor at Hughes Spalding, and the help of Angela Smith, the ED supervisor, and Melia Stephens, the inpatient supervisor. The biggest thanks we have is to Katie Bubser, a child life specialist at Egleston. She provided all of the materials we used to create the See! System. She also was generous enough to let us videotape her for our video. We also had help from Alicia Sanchez, who translated all of our information into Spanish for the Spanish part of the system and starred in the Spanish video.

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